Observations on the traditional phytotherapy of *Tridax procumbens* L. in Buxa Tiger Reserve, West Bengal

Tridax procumbens L., frequently referred to as coat buttons or *Tridax* Daisy, is a member of the Asteraceae family. It is called as Tridhara or Bishalya Karani in the state of West Bengal (Ghosh & al., 2019).

Due to its traditional use as a medicinal plant, it holds critical importance in the tribal regions of the Buxa Tiger Reserve (BTR). With a total area of 760.87 sq. km, the BTR is situated in the Alipurduar district of West Bengal, India. Its geo-cordinates range from 26°30' N to 26°55' N and 89°20' E to 89°55' E. The core zone of the BTR encompasses 385.02 sq. km, which includes both the Buxa Wildlife Sanctuary (252 sq. km) and the Buxa National Park (117 sq. km). The remaining 375.85 sq. km make up the buffer area, which is a reserve forest that is divided into two forest divisions and has thirteen forest ranges. According to Chatterjee (2018), the ethnic groups residing in and around the BTR include the Bhutia, Dukpa, Garo, Madesia (Santhal), Mechia, Nepali, Oraon, Rava, and Rajbanshi. This study gives an overview of the occurrence of *Tridax procumbens* L. in BTR and how it is used to treat leech bites and in traditional phytotherapy. This overview is based on the observations that were made during the field survey in BTR.

Botanical Name: **Tridax procumbens** L.

Family: Asteraceae

Common Names: Tridhara, Bishalya Karani

Identifying Characters: Annual or perennial herb; stem is ascending to 30–50 cm in height, branched, sparsely hairy, rooted at nodes; leaves opposite, simple, fleshy, exstipulate, shortly petiolate, lanceolate to ovate, 3–7 cm long, irregularly toothed along margin, base wedge-shaped, hairy on both surfaces; inflorescence a capitulum; flower tubular, yellow; ray florets and disc florets with basal placentation; fruit achene, covered with stiff hairs and having a feathery, plume-like white pappus at one end, which assists in aerial dispersal.

T. procumbens L. is native from Mexico to tropical America, naturalized in tropical Africa, Asia, and Australia, and found almost throughout India up to 2400 m asl.

Flowering & Fruiting: Throughout the year.

Phytochemistry & Pharmacology: *T. procumbens* L. contains a variety of minerals, including iron, copper, manganese, sodium, zinc, magnesium, phosphorus, potassium, selenium, and calcium. The aqueous extract includes phytochemicals such alkaloids, steroids, carotenoids, flavonoids (catechins and flavones), saponins, and tannins. Flavonoids (centaureidin and centaurein) and bergenin are extracted using ethyl acetate as an organic solvent. The 2° metabolites include flavonoids, sterols, lipid components, luteolin, glucoluteolin, quercetin, isoquercetin, and fumaric acid (Gubbiveeranna & Nagaraju, 2016).

The herb is significant because it has several medicinal applications, including liver protection, immune system stimulation, wound healing (Udupa & al. 1995), combating diabetes, germs, inflammation, and free radicals, as well as treating bronchial catarrh, diarrhea, dysentery, and hair related problems (Amutha & al. 2019)

Phytoremediation activity: Phytoremediation is the use of plants to absorb and remove hazardous substances from the environment or to limit their bioavailability in soil (Farouq & Adjarho, 2022). Govarthanan & al. (2016) reported that the roots of *T. procumbens* have an endophytic bacterial population of *Paenibacillus* sp., which could successfully remove heavy metals like Cr, Cu, Ni, Pb, and Cd from contaminated soil in our environment.

Bio-adsorbent: According to Suneetha and Ravindhranath (2016), *T. procumbens* leaf ash has the potential to remove nitrite ions from polluted waters in India. They have successfully applied this low-cost biosorbent to real groundwater samples and observed positive results.

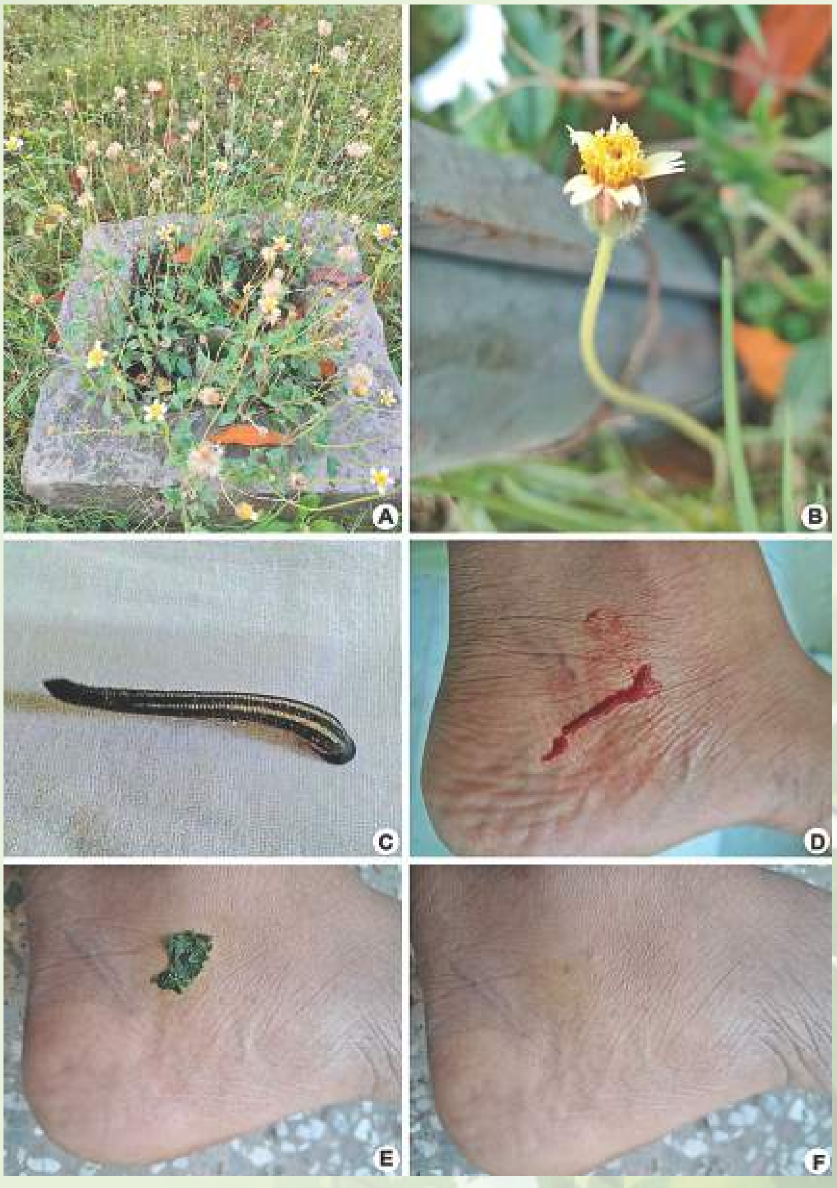

Fig: Tridax procumbens - (A) Plant in its natural habitat; (B) A single flower; (C) Leech; (D) Bleeding from the site of the leech bite; (E) Leaf paste applied to the site of the leech bite; (F) Completely immerse the leech bite site.

Based on the experiment by Jagaba & al. (2019), the activated carbon derived from *T. procumbens* possesses the ability to absorb a large quantity of fluoride from the drinking water in the Nigerian village. This activated carbon is a simple, cheap, non-toxic and environmentally friendly adsorbent that helps in defluoridation of drinking water in Nigeria.

Traditional phytotherapy:

T. procumbens L. has long been utilized in India as an anticoagulant, antimicrobial, insect repellent, and wound healing agent (Singh, 2022). It is also used for treating boils, blisters, and ulcers (Mnaje & al. 2022). In ethnomedicine, leaf decoctions are used to treat infectious skin ailments. It is a well-known ayurvedic treatment for liver diseases since plant decoctions have hepatoprotective properties (Ghosh & al. 2019). Furthermore, the extracts are utilized to treat gastroenteritis and heartburn. It is commonly used in wound healing to prevent bleeding and speed up the healing process. The plant is also used to treat excessive blood pressure, blood glucose levels, dysentery, and severe diarrhoea. It helps to prevent hair loss and increase hair growth. The herb may also be used to treat respiratory conditions (Shanware & al. 2023). It possesses powerful immunomodulatory and insect repellent properties. In West Africa and the tropical regions of the globe, local medical practitioners and indigenous peoples utilize the plant's leaves to treat conjunctivitis (Nia & al. 2003). This medicinal plant is also often used in ethnomedicine to treat jaundice and liver diseases. Ethanol decoctions of *T. procumbens* L. were used to treat kidney stones (Ghosh & al. 2019).

Leach bite cure: *Leech infestation:* In tropical country's rural areas, leech bite is widespread. People travelling in marshy regions or across slow-moving brooks or streams are the most common casualties. Leeches typically infest the host's bodily surface. They seldom enter by the nose, anus, vagina, or penis. (Pal & al., 2016).

Case report: While doing a field survey in BTR, our team mates were bitten by leeches. Leeches are hermaphroditic parasites; they utilize their anterior oral suckers to ingest food from the host's body. Manual removal of the leeches was unsuccessful because their anterior oral suckers were strongly adhered to the target substratum. When the leech attaches to the host, it emits an anesthetic that prevents the host from detecting the parasite. The saliva of leeches includes hirudin, a powerful anticoagulant. This causes prolonged bleeding from the leech bite, enabling the organism to feed while also resulting in prolonged bleeding once detached.

In BTR, it was observed that local Garo tribal communities utilize *T. procumbens* L. to cease bleeding after a leech bite by plucking 6–8 fresh leaves, smashing them with a mortar pestle, and applying the paste to the surface of the leech bite area. The paste is left to air dry on the infected area for some time, and the bleeding ceases naturally. If required, the paste is reapplied within 1 hour. Leech bites are usually painless; however, in most cases, the leech bite sites will start to itch on the second day after treatment and will then continue to itch for about 2–3 days. This is a good sign, as the itching is due to histamine release and shows that healing is taking place at the site. The leech bites can also cause varying degrees of inflammation (swelling, redness) at and around the bite sites. Along with any itching, the signs of inflammation will usually subside within a few days of the leech treatment. After 7–14 days, the wound marks completely heal, and most of the time they become unrecognizable.

The Garo community informed us that some people feel pleasantly drowsy for a few hours after a excessive leech bite.

Conclusion: The Garo tribes of Buxa Tiger Reserve in West Bengal, India, have long utilized *Tridax procumbens* L. leaf pastes to treat leech bites. It cures leech bites by preventing excess blood loss. However, traditional phytotherapy approaches need more study to evolve into a suitable pharmacological treatment that is readily available to ordinary people in the event of a leech bite.

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